



Introduction to Sunflower Nutrition and Product Applications

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The Genus *Helianthus* (sunflower) is diverse



Helianthus pumilus



Helianthus atrorubens



Helianthus tuberosus



Helianthus grosseserratus



Helianthus cusickii



Helianthus annuus



Helianthus ciliarus



Helianthus argophyllus



Helianthus giganteus



Helianthus laevigatus



Helianthus resinosus



Helianthus simulans



Helianthus heterophyllus

Credit: Dr. Brady Vick



The Domesticated sunflower

Helianthus annuus L. is the domesticated or cultivated species.

- Use as an ornamental in gardens
- Seed for food production





Types of Sunflower

Oilseed

Very high in oil content and is processed into sunflower oil and meal. It is also used as bird feed.



Non-oilseed (confectionary sunflower)

Large black and white striped seed used in food products from snacks to breads.

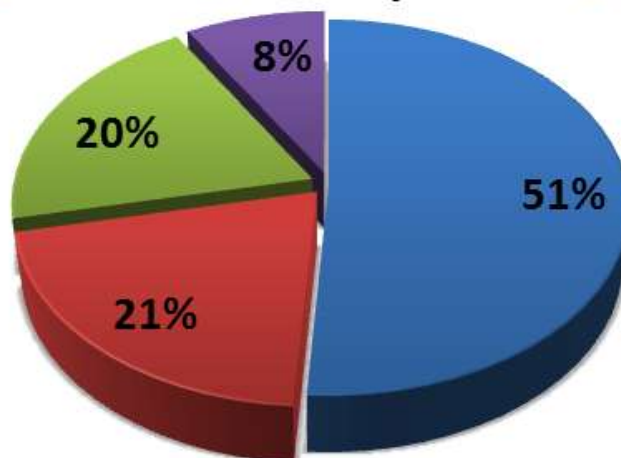




Nutrient compositions

Sunflower composition

■ Fat ■ Protein ■ Carbohydrates ■ Dietary fiber



Nutrients per 100g of sunflower

%DV

Fat

79.2

Protein

41.6

Carbohydrates

6.7

Dietary fiber

34.4



Nutrition benefits of sunflower oil

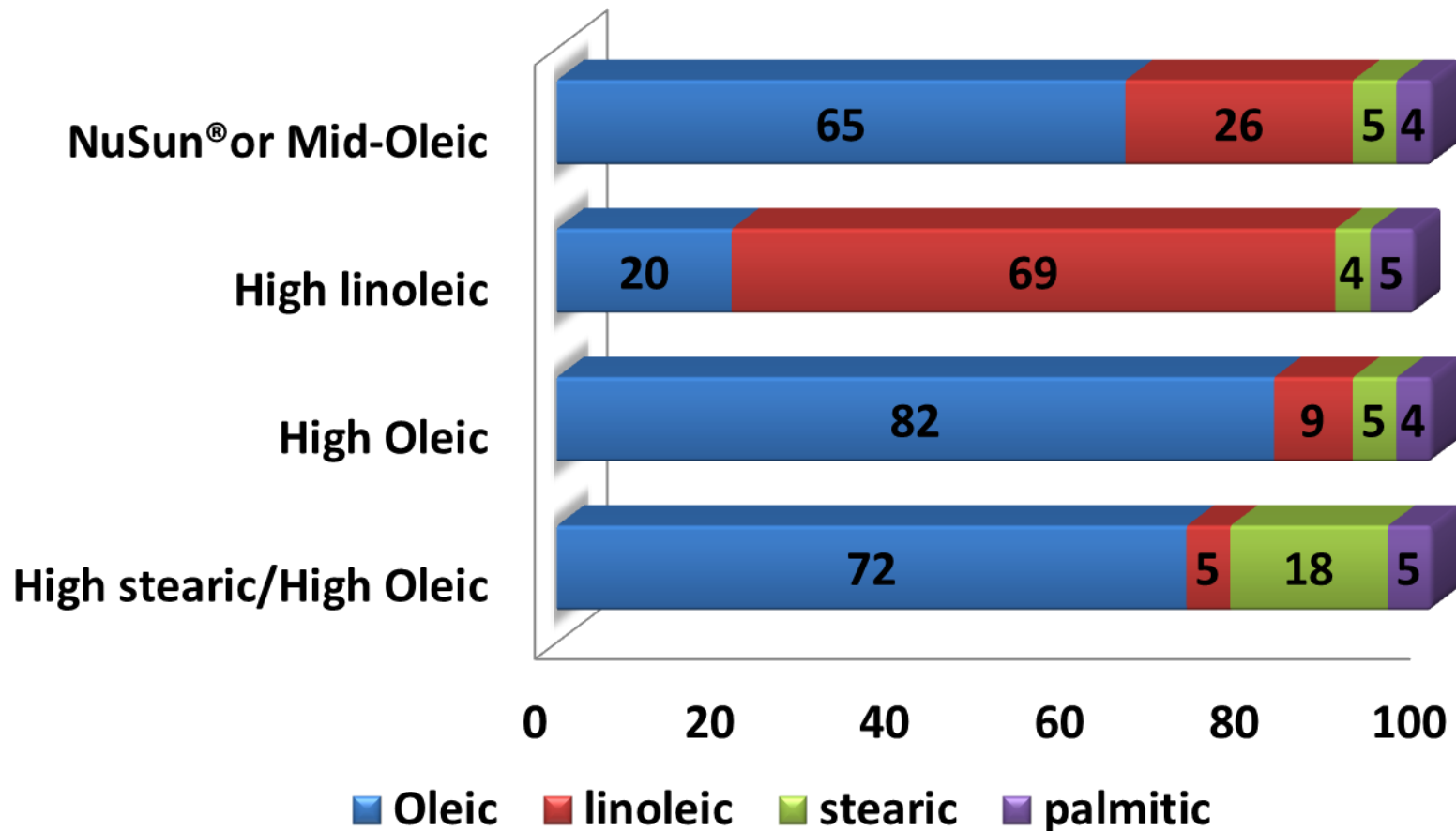
- Sunflower oil is grown with four different fat profiles.
- All sunflower oil is low in saturated fat, provides essential fatty acids, and is a great source of vitamin E.
- NuSun[®] sunflower contains 66% of the RDA for vitamin E per one-tablespoon serving.



Source: National Sunflower Association



Four types of sunflower oil



Source: National Sunflower Association



Nutrient compositions of sunflower kernels

Sunflower is high in several micronutrients!

Nutrients	Unit	Value	%DV
Vitamin A	IU	50.0	1.0
Vit B1- Thiamin	mg	1.5	98.7
Vit B2- Riboflavin	mg	0.4	20.9
Vit B3- Niacin	mg	8.3	41.7
Vit B6	mg	1.4	67.3
Vit E	IU	46.5	165.0
Folate	mcg	227.0	56.8
Pantothenic Acid	mg	1.1	11.3

Nutrients	Unit	Value	%DV
Copper	mg	1.8	90.0
Iron	mg	5.3	29.2
Magnesium	mg	325.0	81.3
Manganese	mg	2.0	97.5
Phosphorus	mg	660.0	66.0
Potassium	mg	645.0	18.4
Selenium	mcg	53.0	75.7
Zinc	mg	5.0	33.3





Health Benefits of Sunflower Kernels

Nutritious

Sunflower seeds are a good source of:

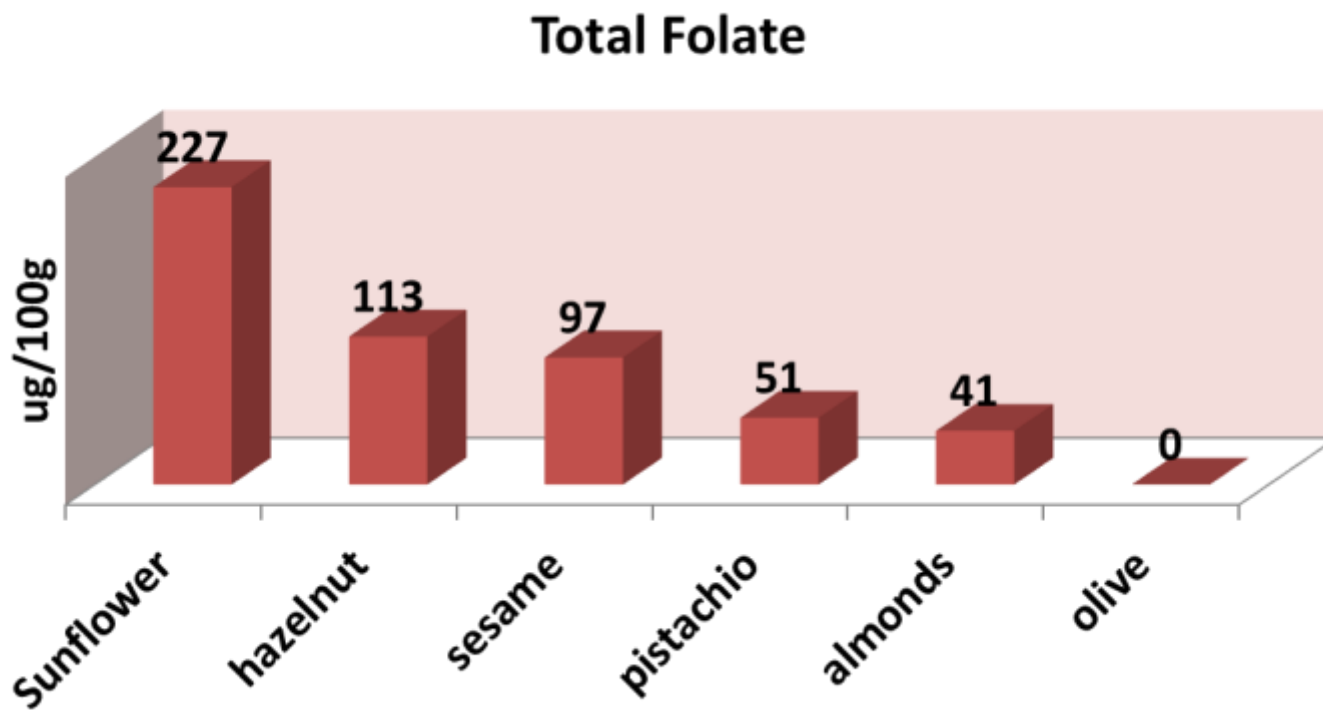
- **Plant protein-** providing 42% of the Daily Value/100g
- **Copper-** providing 90% of Daily Value/ 100g
- **Fiber-** 34%/100g
- **Zinc and Iron-** 30%/100g





Health Benefits of Sunflower Kernels

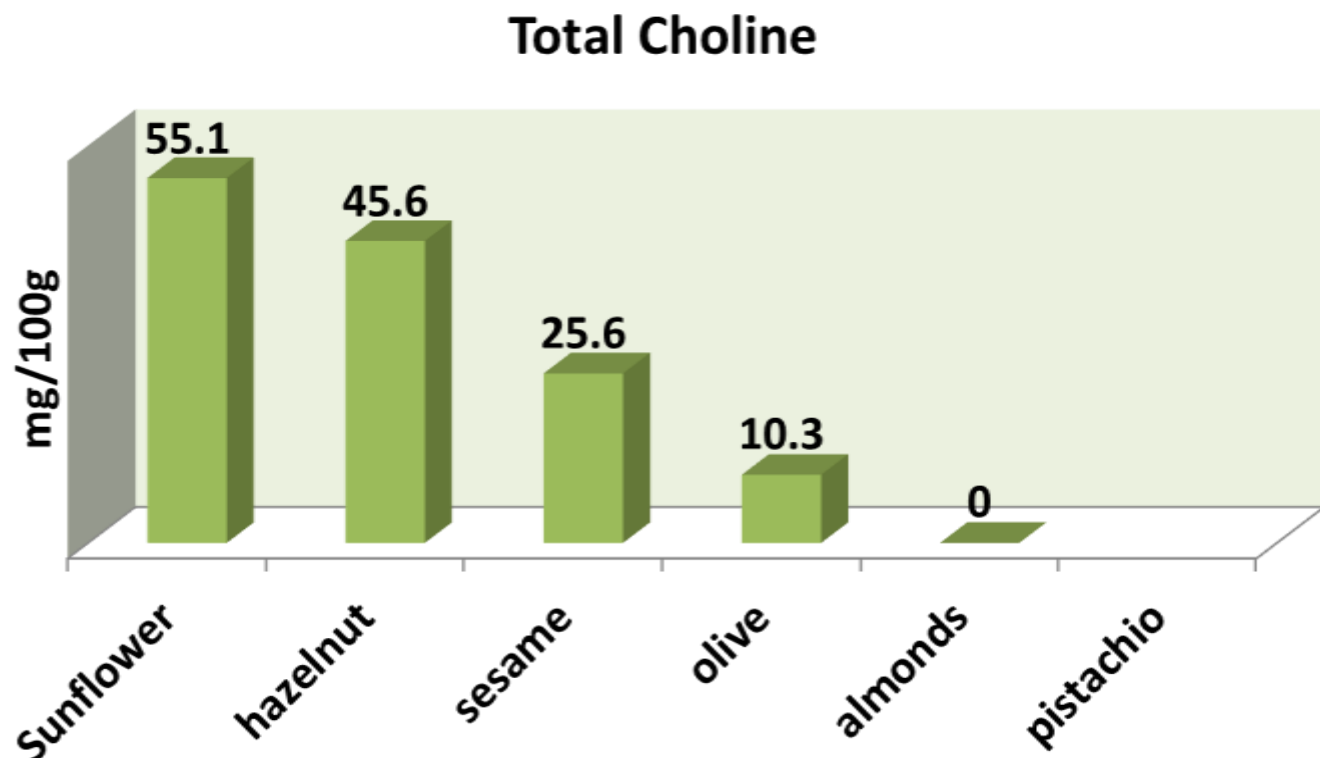
Folate support red blood cell production, healthy blood circulation, nerve function, and protect against congenital malformations.





Health Benefits of Sunflower Kernels

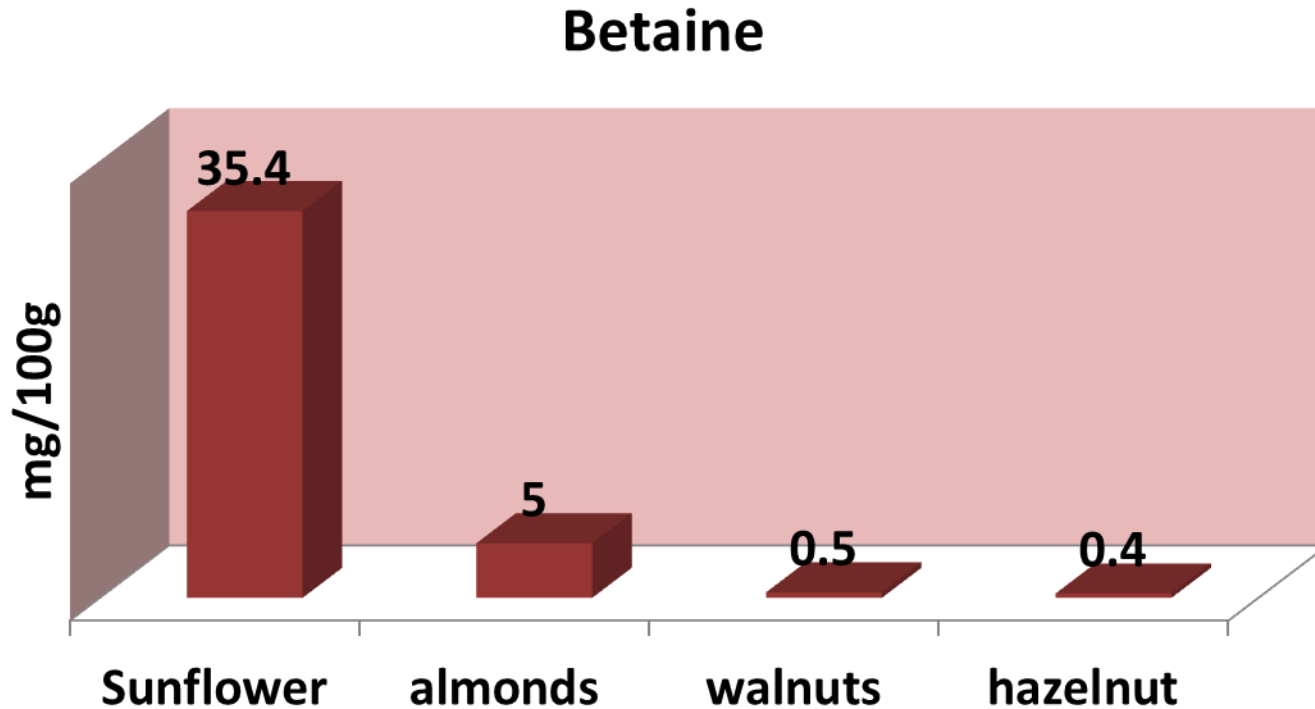
Choline contribute to memory and various cognition systems in the brain.





Health Benefits of Sunflower Kernels

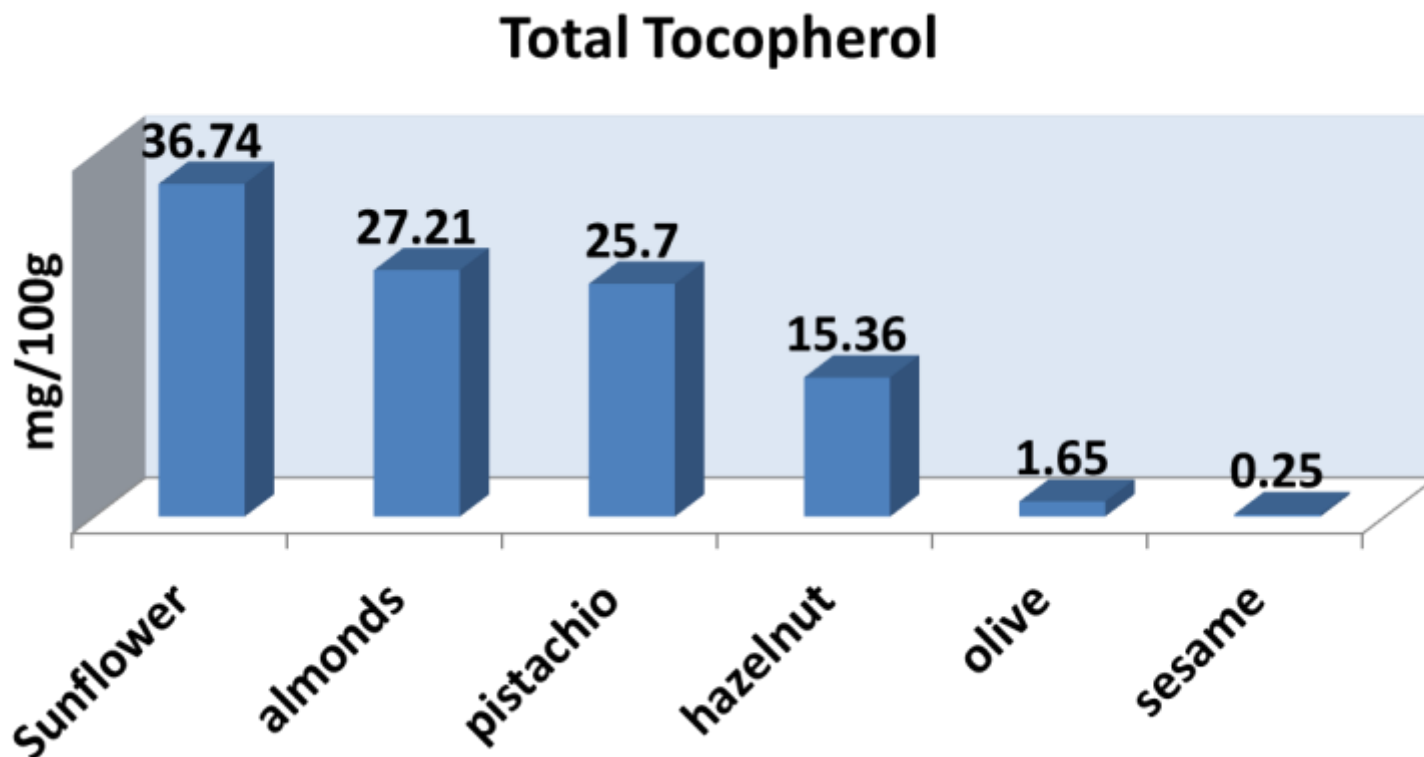
Betaine may protect against cardiovascular disease.





Health Benefits of Sunflower Kernels

Vitamin E may protect against cardiovascular disease.

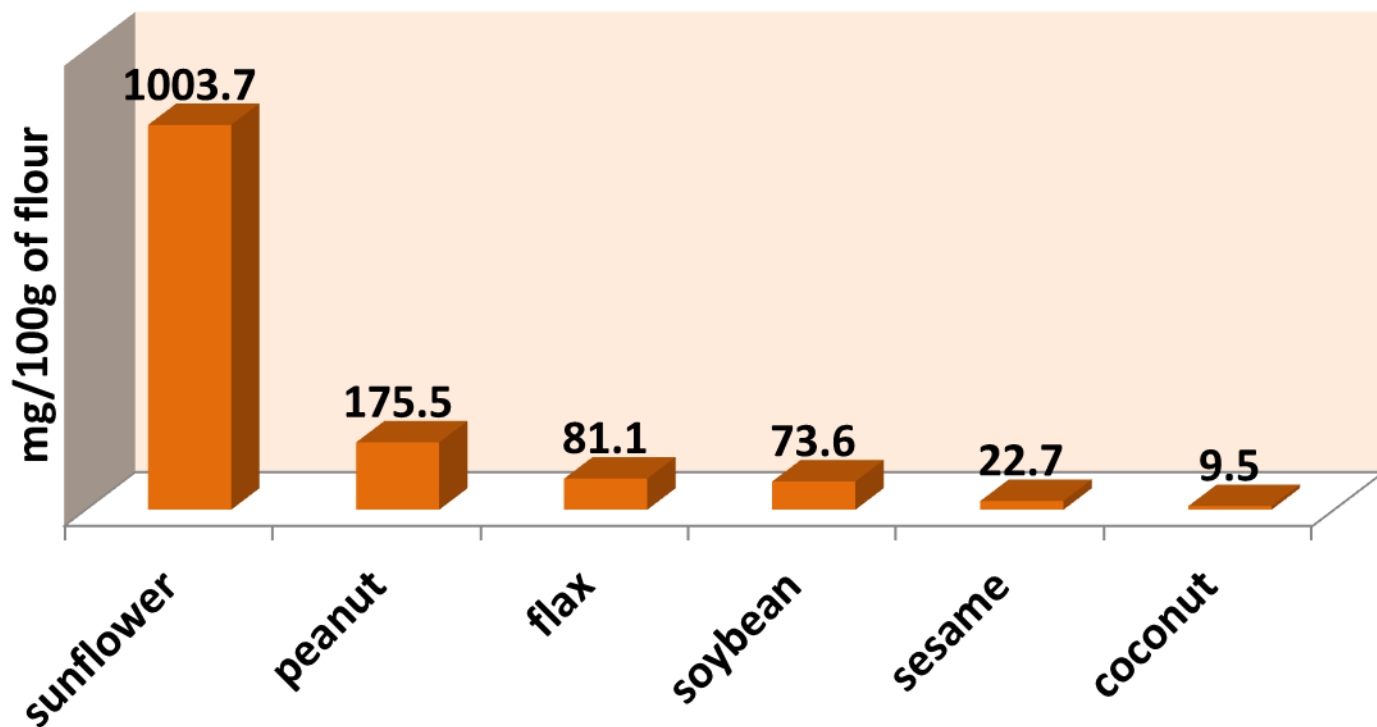




Health Benefits of Sunflower Kernels

Phenolic acids antioxidant and anticarcinogen

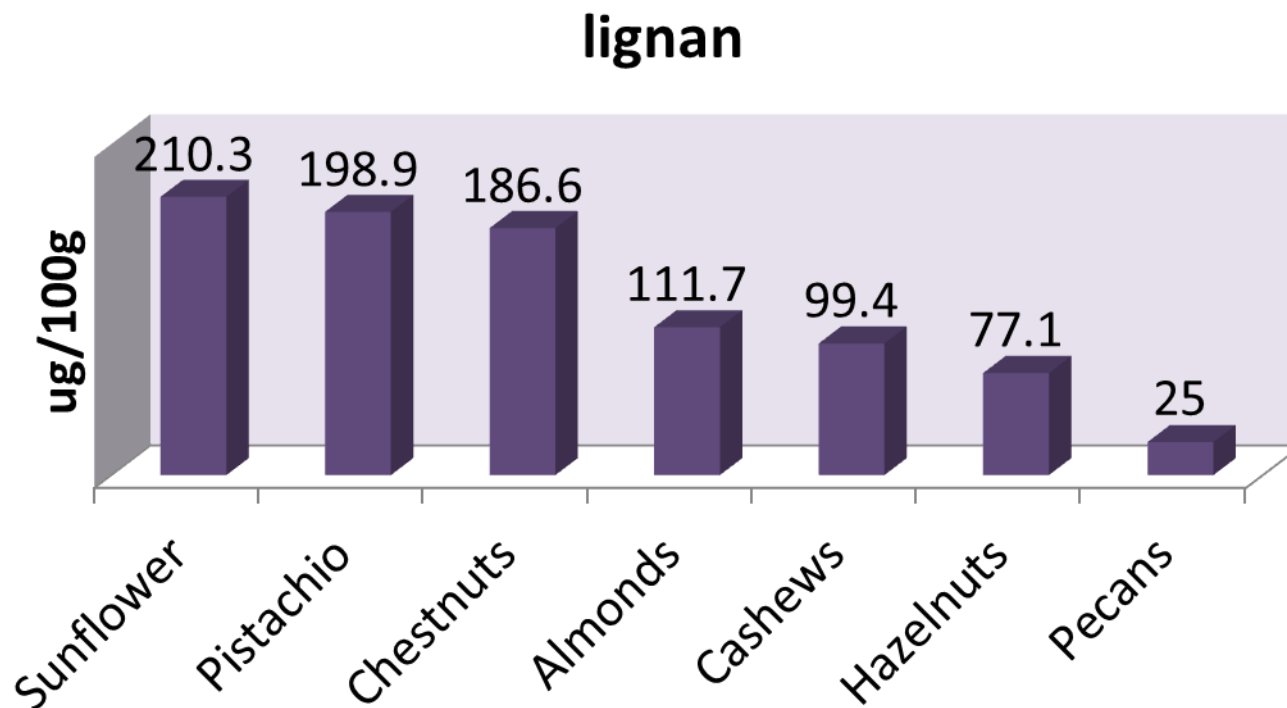
Chlorogenic acid (Phenolic acid)





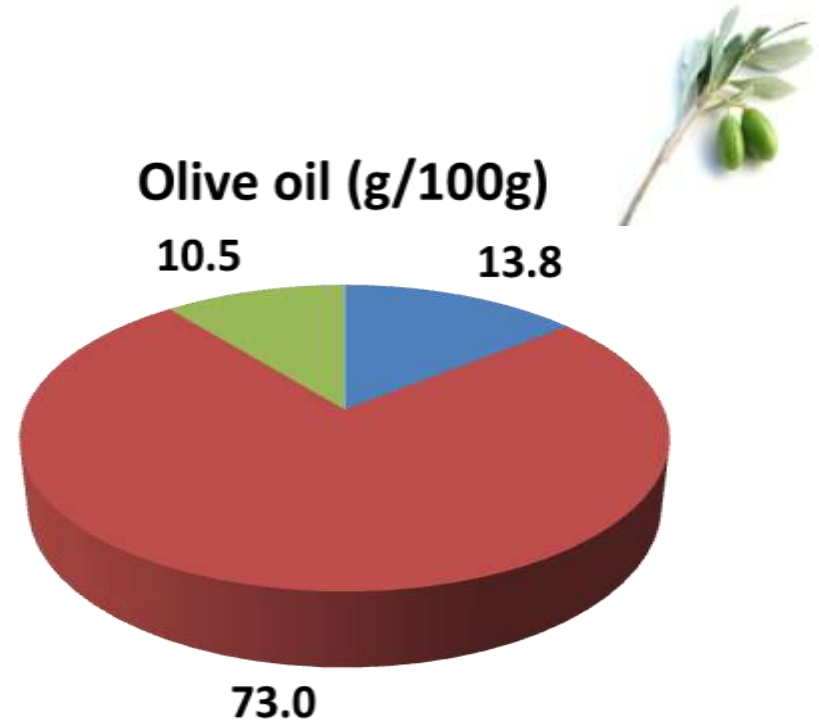
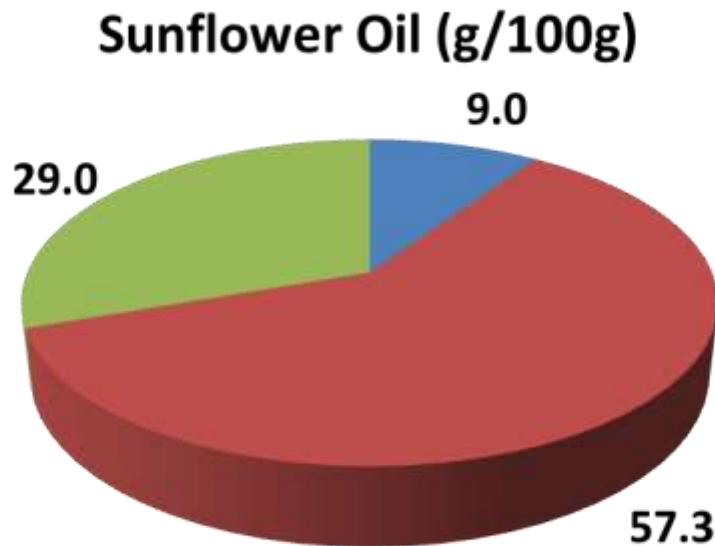
Health Benefits of Sunflower Kernels

Lignans may protect against heart disease and some cancers; lowers LDL cholesterol and triglycerides





Sunflower Oil versus Olive Oil



■ Total Saturates ■ Monosaturates ■ Polyunsaturates



Sunflower Oil versus Olive Oil

- Sunflower oil was incorporated into the test diets in granola, bars, sandwich, spreads, and as a cooking oil.
- The study showed that individuals experienced a significant total and low-density lipoprotein (LDL) cholesterol lowering on the sunflower oil diet compared to the average American diet.
- Test subjects did not experience significant cholesterol lowering on the olive oil diet.

Dietary Guidelines for Americans 2005. U.S. Department of Health and Human Services and U.S. Department of Agriculture. HYPERLINK <http://www.healthierus.gov/dietary>"
www.healthierus.gov/dietaryguidelines



Research studies

- Health researchers estimate that replacing 5 percent of calories from saturated fat with calories from trans-free, unsaturated oil would reduce the risk of heart disease by 42 percent.



Hu FB, Willett, WC, et al. Dietary Fat intake and the risk of coronary heart disease risk in women. New England



Research studies

- Bread enriched with seeds of High-oleic sunflower significantly improves the daily intake of fat, fiber, alpha-tocopherol and linolenic acid.
- 300g of bread enriched with sunflower can give 50-70% of Copper, 14-24% of Zinc, and 5.6 times of Fiber
- Selenium
 - 15% of world population is deficient
 - Heart disease, inflammatory disease, neurological process, bind toxic elements.
 - 12.2% control, 70.4% Sunflower Bread



SKRBIC, B., and Macvanin, N. 2011. Nutritional and sensorial aspects of wheat bread and enriched with high oleic sunflower seed. *Acta Alimentaria*. 40: 194-204.



Shelf life

- Raw sunflowers are recommended for use in baked products.
- Raw Sunflowers are stable up to 52 weeks

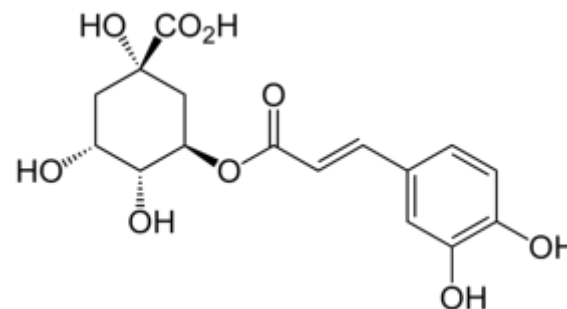


Buendia, M.O., and B.L. D'Appolonia. "Storage Studies on Confectionery Sunflower Kernels." *Cereal Chemistry* 63:85 (1986).



Chlorogenic Acid

- Sunflowers contain polyphenolic compounds
 - **Chlorogenic acid**
- Phenolic acids: antioxidant and anti-carcinogen.
- Polyphenolic compound oxidizes in many foods and produce a green color.
- This occurs when the pH of the food is raised above neutrality (alkaline condition).
- Formulations that were lower in pH generally produced products with lighter and more consistent color.





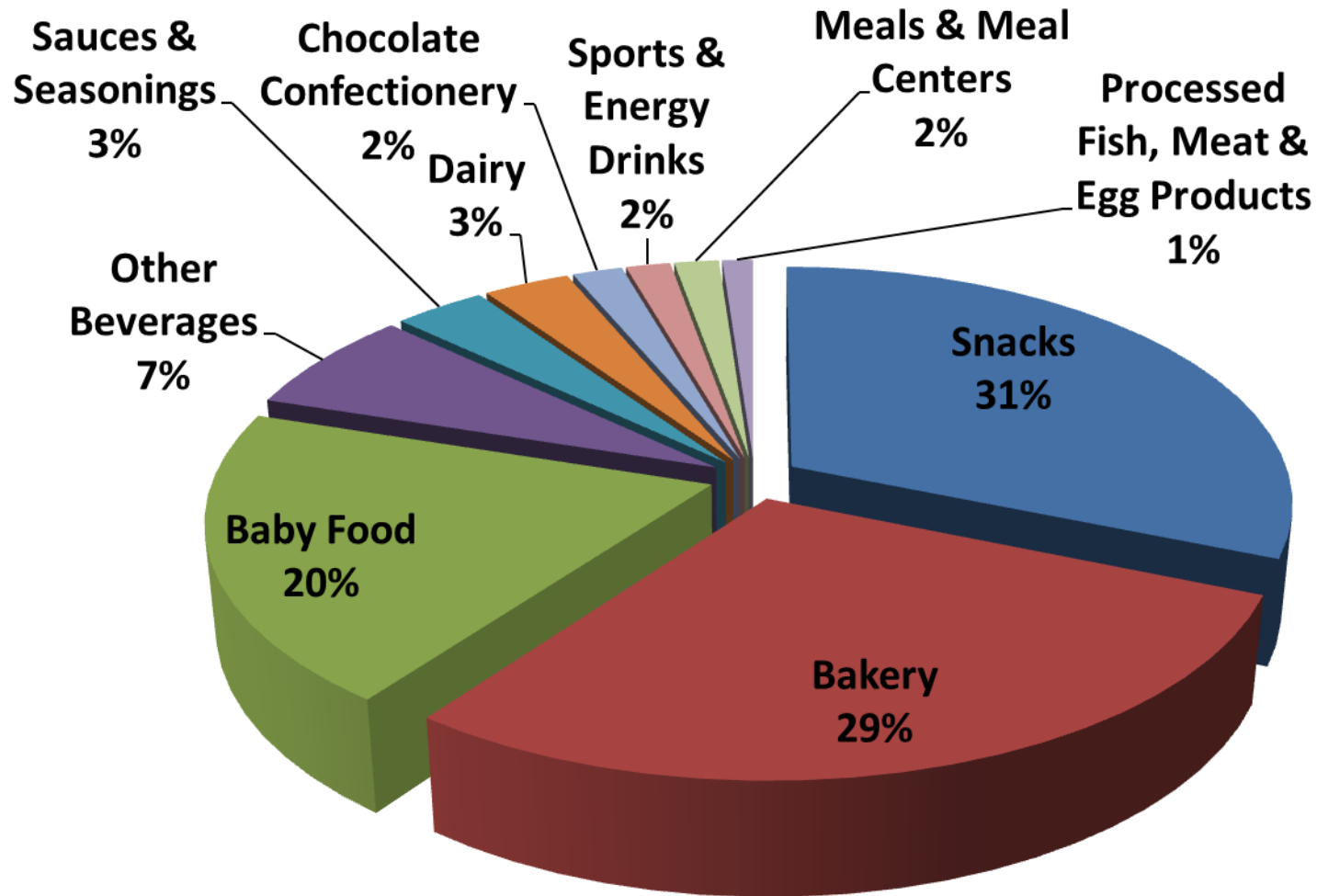
Sunflower Application

Applications consist of using:

- Oil
- Kernel



Product Applications with Sunflower Oil





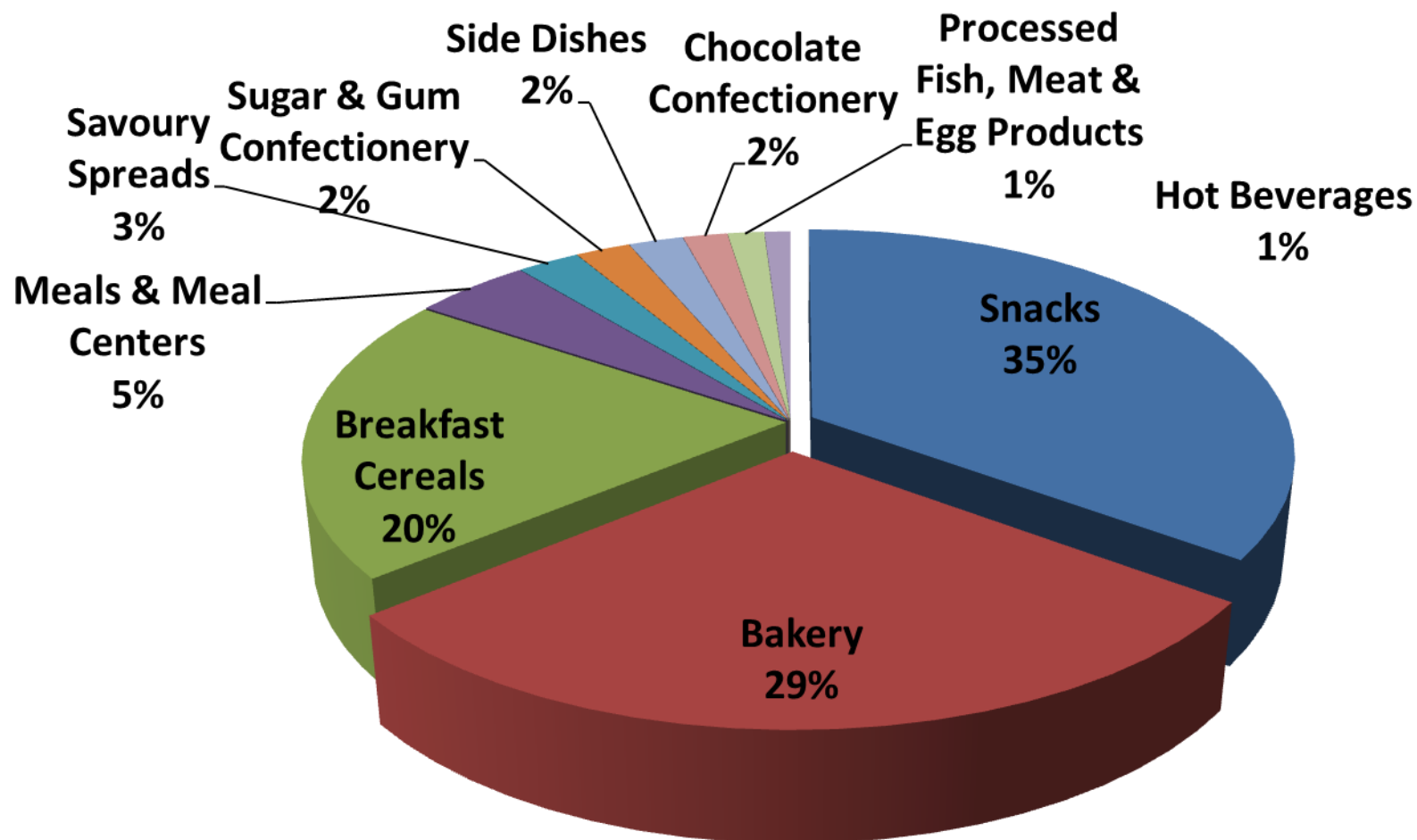
Characteristics of Sunflower Oils

Chemical and Physical Characteristics	Crude Sunflower oil	NuSun Mid-Oleic	High Oleic
Relative Density (x°C/water at 20°C)	0.918-0.923 (x=20°C)	0.914	0.909-0.915 (x=25°C)
Refractive Index (ND 40C)	1.461-1.468	1.461-1.471	1.467-1.471
Saponification Value (mg KOH/g oil)	188-194	190-191	182-194
Iodine Value (by calculation from fatty acid content)	118-141	94-122	78-90
Unsaponifiable matter (g/kg)	<15	<15	<15

Warner, K., Vick, B., Kleingartner, L., Isaak, R., and Doroff, K. "Compositions of sunflower, Nusun (mid-oleic sunflower) and high-oleic sunflower oils." *Proc. Sunflower Res. Workshop, Fargo, ND*. Vol. 16. 2003.



Product Applications with Sunflower kernels





Sunflower snacks applications



Cereal Chips



Granola bar



Muesli



snack



Muffin mix



Trail mix



Tortilla chips



Breadsticks



Sunflower Bakery Applications



Cracker



Breads



Florentine



Bread mix



Ruffs



Cookies



Biscuits



2012 New Products with Sunflower Kernels



Brazil- Rice with 7grains



Spain- Cereals



USA – Sunflower drink



Colombia- Crackers



China Five-nut cake



USA- Sunflower butter cups



Sweden- Low carb breads



Thank you for your time

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